Nasal Analysis and Anatomy: Anthropometric Proportional Assessment in Asians—Aesthetic Balance from Forehead to Chin, Part I

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Abstract

Asian rhinoplasty patients can be analyzed by the nose's component structures and their relationship to one another. A comprehensive understanding of the underlying anatomical structure including bone, cartilage, and soft tissue contributes to better preoperative planning. To achieve an optimal postoperative result, a thorough preoperative analysis utilizing standardized measurements is essential. Knowledge of the Asian nose facilitates the use of an algorithmic approach to Asian rhinoplasty that increases surgical predictability.

Keywords

- Asian nasal anatomy
- Asian rhinoplasty
- nasal anatomy
- Asian nose morphology
- Asian nasal analysis
- rhinoplasty

Nasal Analysis

Most of the published nasal aesthetic norms are from measurements of Caucasian noses, and these numerical dimensions may differ in anatomy and morphology from other racial groups. The plastic surgeon treating Asian patients is usually confronted with a request to "aesthetically" improve the shape and dimensions of their nose; the surgeon, therefore, needs to be aware of the norms or standards for the typical Asian nose, and how they compare with noses of other racial types.[1] We divided the surface morphology into five main anatomical subunits in our analysis of Asian-specific anatomical features (►**Fig. 1**).

Dorsum

Radix (N)

The height of the nasal radix is fundamental when assessing the profile of individuals.[2] In a patient with a high radix, the profile of the forehead continues into the nose in a straight line and the nose appears disproportionally long, whereas a deep nasofrontal angle gives the illusion of a short nose.[3] The ideal vertical position of the nasion (N) is between the supratarsal fold and the lash line of the upper eyelid.[4] However, the ideal position for an Asian nose is to be at the level or lower than the lower margin of the upper eyelid in forward gaze. In some cases, it can be acceptable even at the level of pupils that makes a more softened profile.[5] If a patient has a less-prominent superior orbital rim and tilted backward forehead, a lower radix is more compatible than a higher radix. Most Asian rhinoplasties need dorsal augmentation with implants to heighten the low dorsum to the pupil level or higher because the applicability of autogenous tissue-based procedures is limited. Implants for dorsal augmentation commonly used in Asia are silicone, Gore-Tex, and Silitex, in that order.[6]

Nasal Root Width (mf-mf)

The ideal width of the nasal bony vault depends on several factors such as facial width, nasal length, tip sharpness, and skin thickness. The Asian feature of a broad face width (zy-zy) frequently comes with a rather wide nasal bony vault. However, it is still usually acceptable when the width is two-thirds of the alar base width or two-thirds of the intercanthal distance (►**Fig. 2**). Wide nasal bones are not rare among Asian patients. Correction of wide nasal bones is

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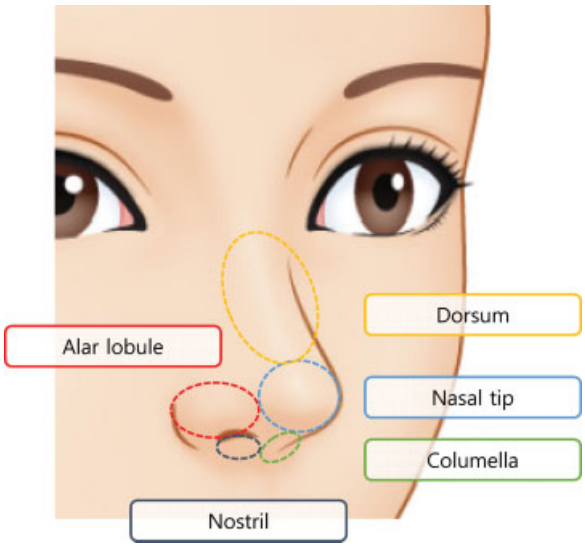

Fig. 1 Surface morphology can be divided into five main anatomical subunits.

commonly done by using medial and lateral osteotomies to move the nasal bone inwards.

Nose Height (n-sn)

The height of the nose is important when assessing the profile of individuals (►**Fig. 3**).[7] Although the profile of Asians appears much different from other ethnic groups, the nasal height (n-sn) is almost identical.[8] Pure dorsal augmentation moves the positional height of the radix upward and gives an elongated look to the nose, and an appearance of relative tip deprojection. For a better tip projection, the dorsum should not be augmented excessively in Asian rhinoplasty, particularly at the radix.

Nasal Bridge Length (n-prn)

Nasal length should be analyzed relative to lower facial proportions. The face height is measured from the soft tissue nasion to menton. The distance from the soft tissue nasion to pronasale is equal to the distance from the stomion to the

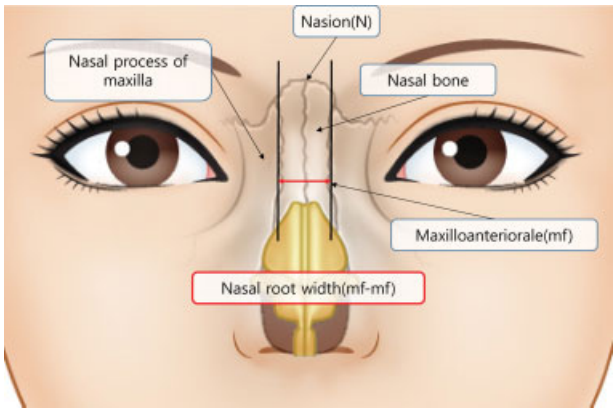

Fig. 2 The nasal root width is two-thirds of the alar base width or two-thirds of the intercanthal distance.

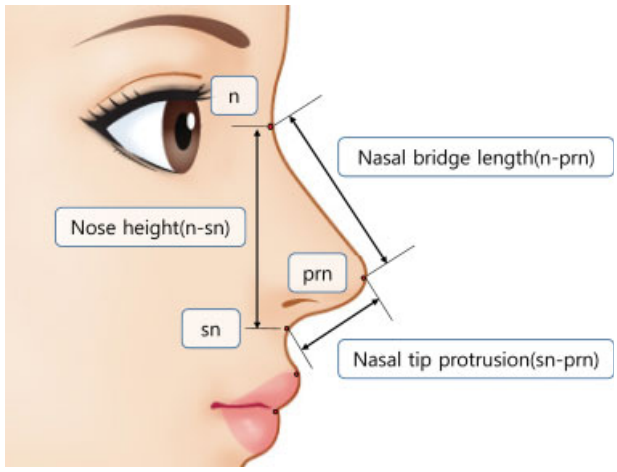

Fig. 3 With the head in the standardized position, nose height, nasal bridge length and nasal tip protrusion are analyzed.

menton (►**Fig. 4**). The nasal bridge length is between the soft tissue nasion to pronasale; it usually measures between 45 to 50 mm, which is shorter than the Caucasian norm. To lengthen the nasal bridge dimension, dorsal augmentation or tip-derotation technique is commonly employed in Asian rhinoplasty.

Dorsal Aesthetic Line

With the frontal view, surgeons can analyze the dorsal aesthetic line. It is a gently diverging curved line between the medial brow and the tip-defining points (►**Fig. 5**). The dorsum of Asian noses tends to be wider and less straight with more concavity at the supraciliary ridge. Augmenting

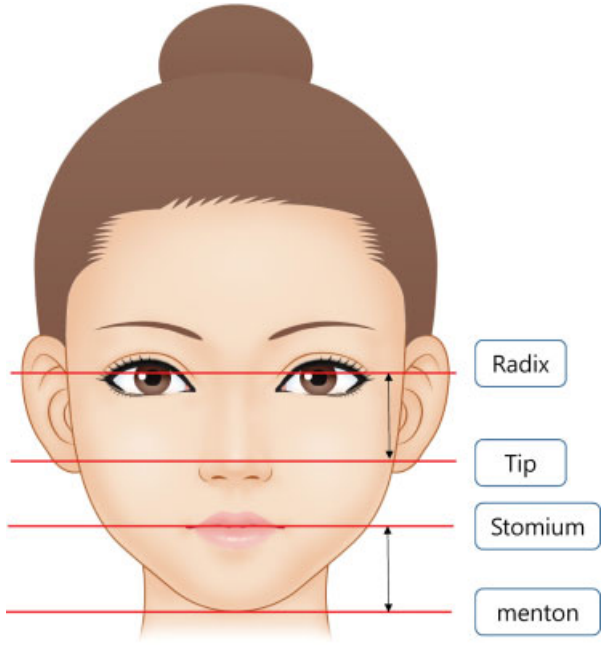

Fig. 4 The distance from the soft tissue nasion to pronasale is equal to the distance from the stomion to the menton.

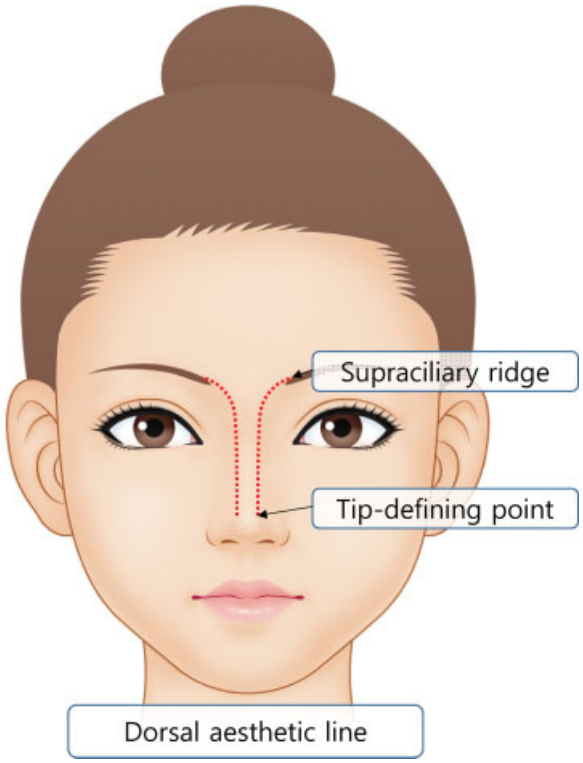

Fig. 5 The dorsal aesthetic line is a gently diverging curved line between the medial brow and the tip defining points.

the dorsum with an implant will lessen the width and straighten the concavity at the same time.

Degree of Deviation

The degree of deviation or crookedness can also be visualized with frontal assessment. A line starting from the midline glabella to the menton helps to assess the degree of deviation (►**Fig. 6**). In the Asian nose, deviation is less prominent even though it may be there to some extent because of the nose's thicker skin quality and less-prominent bony and cartilaginous frame works.

Choice of Implants for Dorsal Augmentation: Silicone, Gore-Tex, Silitex

Due to the thicker skin quality, implants are less visible in Asians than Caucasians. However, because of the thickness of the soft tissues, augmentation effects are less prominent. Therefore, a 1- to 2-mm implant thicker than the direct measurement from the surface anatomy is usually required, according to the skin thickness.

Nasal Tip

Nasal Tip Protrusion (sn-prn)

Compared with Caucasians, the nasal tip is more or less retruded and poorly defined because of the weak midline support of the columellar frame work and abundant soft tissues under the skin. To beautify the shape of the tip, a septal extension with tip sutures or tip grafts is commonly performed.

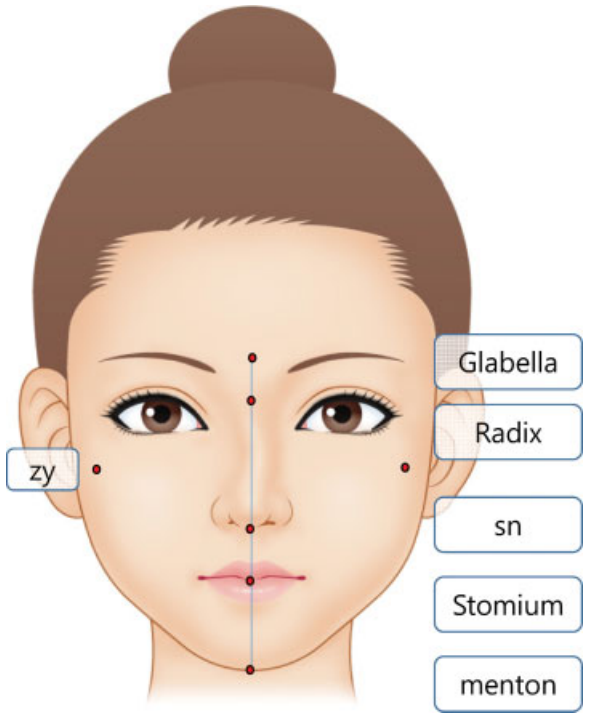

Fig. 6 A line starting from the midline glabella to the menton helps to assess the degree of deviation.

Tip Rotation and Derotation

Short nasal length and poor nasal tip protrusion of the Asian nose usually requires tip-rotation usage rather than tip-derotation technique. To derotate the tip, tip sutures such as TES (tip extension suture) or derotation grafts are useful tools.

Nasal Tip Angle (n-prn-sn)

The nasal tip angle is formed by the lines following the general direction of the columella and the nasal bridge (►**Fig. 7**). Tip rotation will make the angle blunt and look

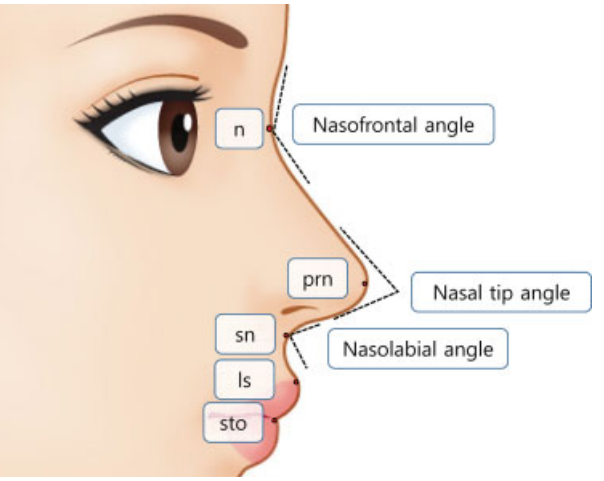

Fig. 7 The nasal tip angle is formed by the lines following the general direction of the columella and the nasal bridge.

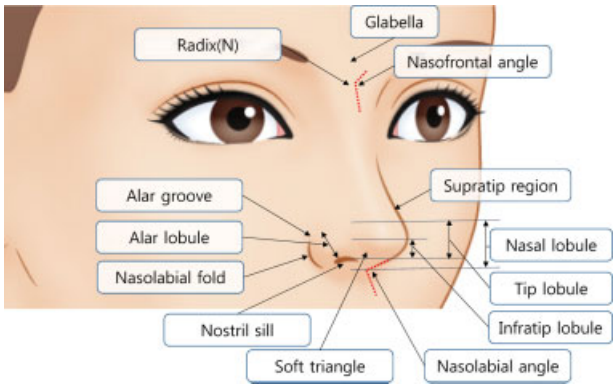

Fig. 8 The balance between the nasal dorsum and the tip-defining points is scrutinized to control the supratip break.

shorter, whereas tip derotation will make the angle acute and look the nose more elongated.

Supratip and Infratip

The balance between the nasal dorsum and the tip-defining points is scrutinized to control the supratip break (►**Fig. 8**). Tip-defining points should project approximately 6 to 10 mm over the nasal dorsum in female patients.[9] The bulbous and poor definition of supratip breakpoint of Asian noses necessitates the approximation of both lower lateral crura, which will increase the projection of the nasal tip and simultaneously give it a better definition, accentuating the supratip.

Tip-Defining Points

The tip-defining point is what provides highlights on the frontal view, created by the dome of the lower lateral cartilage. Asian noses have a wide angle of domal divergence, blunting the tip-defining points. Thick soft tissues underlying the skin also contribute to the ambiguity of the tip definition. The interdomal suture technique reduces the angle of domal divergence, narrows the tip-defining points, potentially further camouflages a columellar or septal extension graft, possibly enhances the infratip lobule, and increases projection.[10]

Columellar Lobular Angle

This angle is formed at the junction of the columella and the infratip lobule, and indicates the junction of the middle and medial crura (►**Fig. 9**). Hypoplastic medial crura in Asian patients contribute to the blunting of this angle, and reinforcing sutures between medial and intermediate crura often exacerbate the ambiguity of the angle. It is better to try to avoid suturing the intermediate crura together to avoid blunting the columellar-lobular angle. The ideal columellar lobular angle is 30 to 45 degrees in females.[11]

Alar Lobule

Nose Width (al-al)

The alar lobule is the morphological width of the nose (►**Fig. 10**). The wider, prominent alar lobule is quite a distinct feature; many Asian patients requesting aesthetic surgery want their prominent alar lobules reduced.[12] Farkas' data also indicate that the Asian nose has a wider alar width in relation to the nasal height.[1] Alar reduction surgery is commonly combined with an Asian rhinoplasty.

Alar Length or Nasal Tip Projection (ac-prn)

Nasal tip projection also could be defined by the anteroposterior distance separating the nasal tip (prn) from the facial surface at the level of the alar fold (ac).[13] Goode's index is calculated using the ratio: AC/BC. A Goode's index between 0.55 and 0.6 corresponds to a normal projection. An index greater than 0.6 corresponds to hyperprojection and less than 0.55 to hypoprojection.[14] Similar to the rule of thirds used to evaluate the nasal proportions relative to the overall face, tip projection is 0.67 of total nasal length as measured from the radix to the tip-defining points (►**Fig. 11**). If the ratio is < 0.67, there is inadequate tip projection. Previously, people thought that augmenting the dorsum would Westernize and improve their look; however, improving tip projection currently has more priority over dorsal augmentation in the

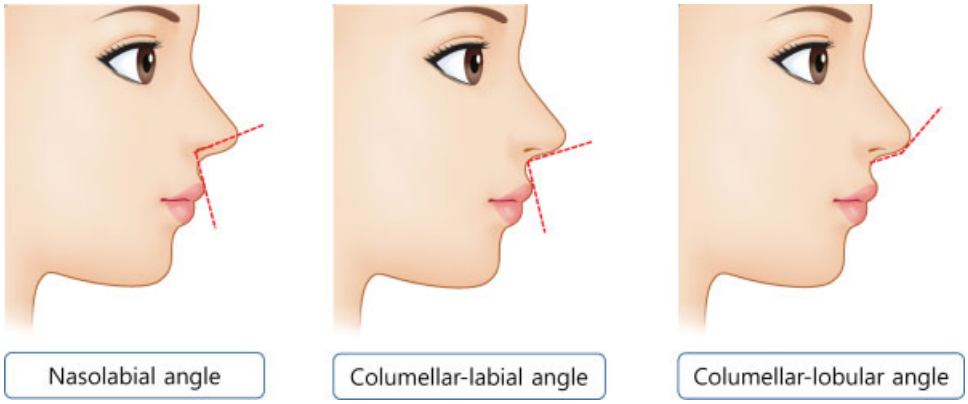

Fig. 9 The angle between the vertical facial plane and a line connecting the anterior and posterior ends of the nostril is the nasolabial angle. The columellar-labial angle is formed by the columella and the upper lip. The columellar-lobular angle is formed at the junction of the columella and the infratip lobule, and indicates the junction of the middle and medial crura.

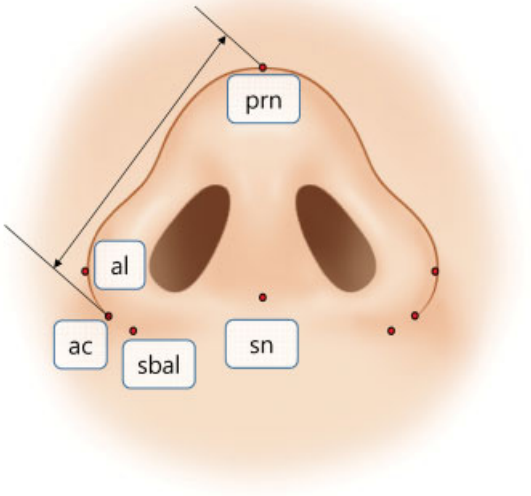

Fig. 10 Nose width is the morphological width of the nose.

Asian nose. Struts, extension grafts, and tip grafts are becoming essential components for tip projection in Asian rhinoplasty.

Interalar Width (ac-ac)

It is the anatomical width of the nose that connects the alar curvature to alar curvature. The width of the alar base is measured from one alar crease to the other and should ideally be equal to the intercanthal distance (►**Fig. 12**). The alar flare is the maximum degree of alar convexity above the alar crease that ideally should not extend more than 2 mm outside the crease. Scars from alar reduction surgery are less noticeable when they are hidden at the curvature. The distance from the midcolumella to each alar curvature should be equal to correct nostril asymmetry.

Interalar Angle (Dome)

The interalar angle is formed near the nose tip by the two tangents touching the alar on either side (►**Fig. 13**). It is used to classify the nose shape into different morphological types.

Alar Thickness

The alar lobule consists of three layers: external skin, muscle, and vestibular skin. The gross appearance of the alar lobule is mainly affected by the volume of the dilator naris anterior muscle, the insertion of the dilator naris posterior muscle, and the thickness of the external skin at the lateral end of the alar circumference.[15] Alar flaring due to thick alar characteristics is more common in Asian noses; it needs to be reduced for a more aesthetic result.

Hanging Ala or Retracted Ala

A line connecting the apex of the nostril to its nadir divides the nostril into equal halves. A retracted ala exists when the distance from this line to the alar rim is greater than 1.5 to 2 mm. A hanging ala occurs when the distance is less than 1.5 to 2 mm.[16]

Nostril

Nostril Floor Width (sbal-sn)

The labial insertion of the alar base is a subalare. The subnasale is the midpoint of the angle at the columella base where the lower border of the nasal septum and the surface of the upper lip meet. A wide nostril floor contributes to alar flaring. Usually 2 to 7 mm of vestibular floor can be excised to correct alar flare in an Asian rhinoplasty. Narrowing the nostril floor can cause a notching deformity on the

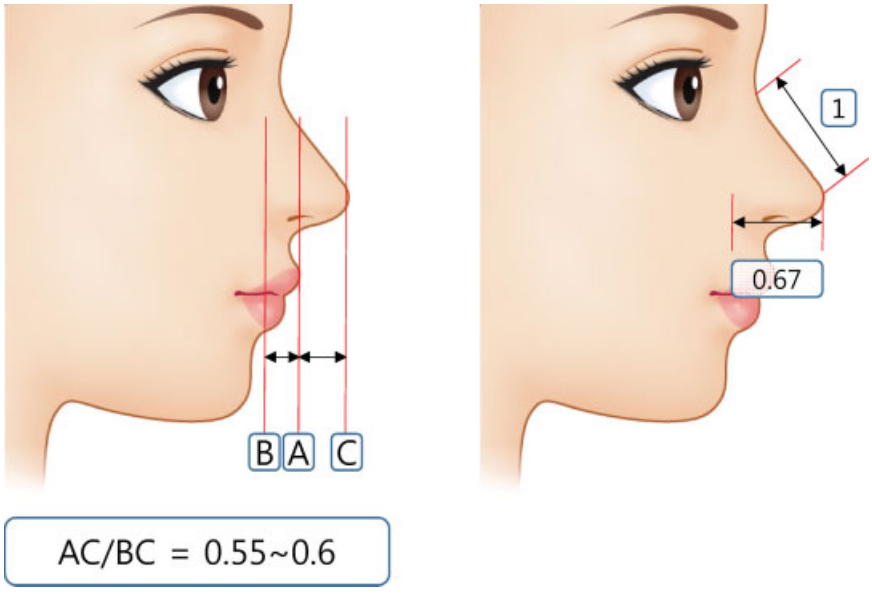

Fig. 11 The tip projection can be analyzed by several techniques, either relative to the nostril or relative to nasal length.

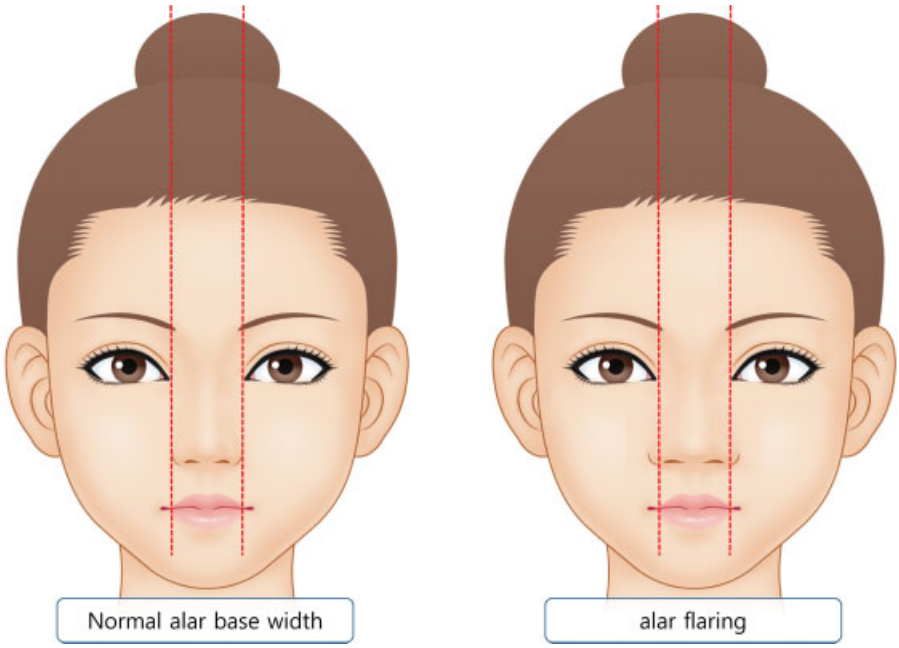

Fig. 12 The width of the alar base is measured from one alar crease to the other and should ideally be equal to the intercanthal distance.

floor so leaving some portion of soft tissue is essential when nasal base reduction surgery is done.

Interaxial Angle (Nostril Inclination)

The interaxial angle is formed at the apex where the two nostril axes meet; it is closely related to the nostril inclination (►**Fig. 13**). Interdomal or middle crural sutures can improve the inclination of the nostrils and increase nostril length minimally.[17]

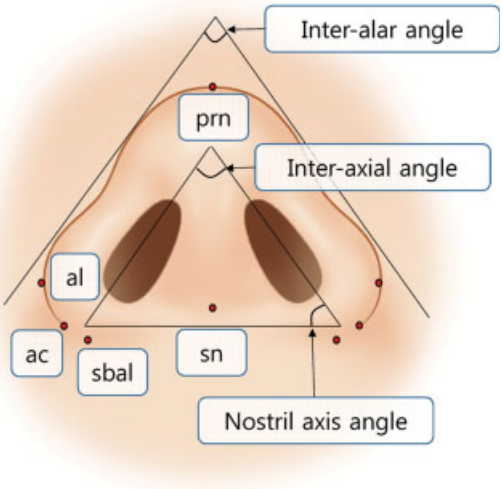

Fig. 13 The interalar angle is formed near the nose tip, by the two tangents touching the alar on either side. The interaxial angle is formed at the apex where the two nostril axes meet; it is closely related to the nostril incline.

Nostril Shape

The nostril type is more symmetrical in Asians (96.4%) than Caucasians (80.1%). The general shape of the nasal base has long been broadly classified as the leptorrhine or long, narrow nose, the mesorrhine or medium nose, and the platyrrhine or short broad nose. The features of the Asian nose from a basal view is usually of the mesorrhine type, different from Caucasian or African American noses (►**Fig. 14**).[18]

Nasolabial Angle (prn-sn-ls)

The angle between the vertical facial plane and the line connecting the anterior and posterior ends of the nostril is the nasolabial angle. The nasolabial angle is usually 95 to 100 degrees in females, and 90 to 95 degrees in males (►**Fig. 9**). Most Asians from Korea or China want to have their nostrils less visible than the current Caucasian standard. Culturally, many Asians believe that too much nostril exposure can cause financial misfortunes. Surgeons should try to individualize the angle according to the patient's wishes.

Columella

Columella Width (sn'-sn') and Length (sn-c')

Compared with the Caucasian population, Asian columella length and width have smaller values.[18,19] Poor medial and lateral crural development contributes to the short and narrow appearance of the columella in Asian populations. As a result, the columella strut is one of the more commonly performed procedures in Asian rhinoplasty.

Hanging or Retracted Columella

A line connecting the apex of the nostril to its nadir divides the nostril into equal halves in the side view. Usually 2 to 4 mm of this skin bridge is visible from this view. If none of

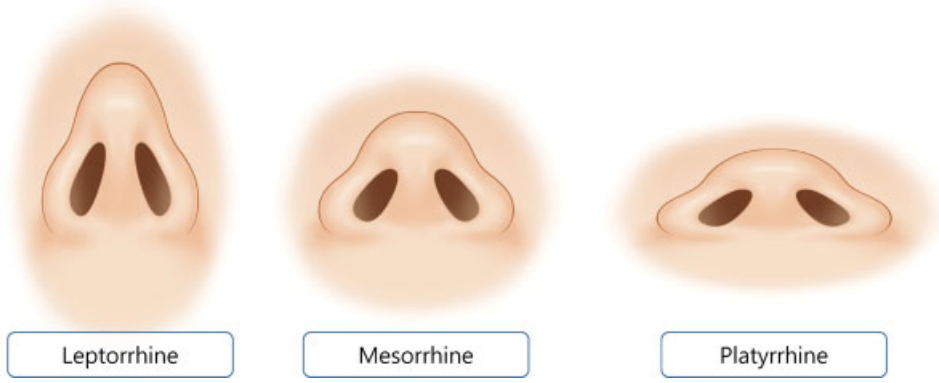

Fig. 14 The features of the Asian nose from a basal view are usually of the mesorrhine type, different from Caucasian or African American noses.

the columella is visible from the side view, it is considered a retracted columella. Asian noses tend to have more retrusive columella.

Columellar Labial Angle

The columellar labial angle is formed by the columella and the upper lip (►**Fig. 9**). The hypoplastic anterior nasal spine of Asian populations often creates an acute columellar-labial angle. This angle is sometimes influenced by a prominent caudal septum or hanging columella, giving the impression of increased tip rotation despite a normal nasolabial angle.

Conclusion

A thorough preoperative analysis of nasal morphology is essential to obtaining optimal results.

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